

Nov. 12, 1963

L. REAMES

3,110,140

BACKING PLATE FOR ABRASIVE DISKS

Filed Jan. 3, 1961

3 Sheets-Sheet 1

FIG. 1

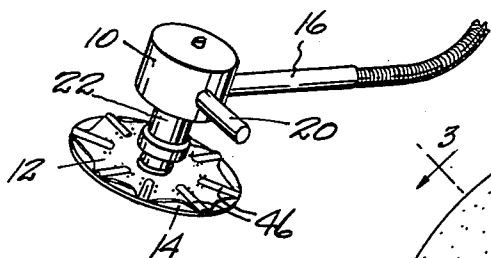


FIG. 2

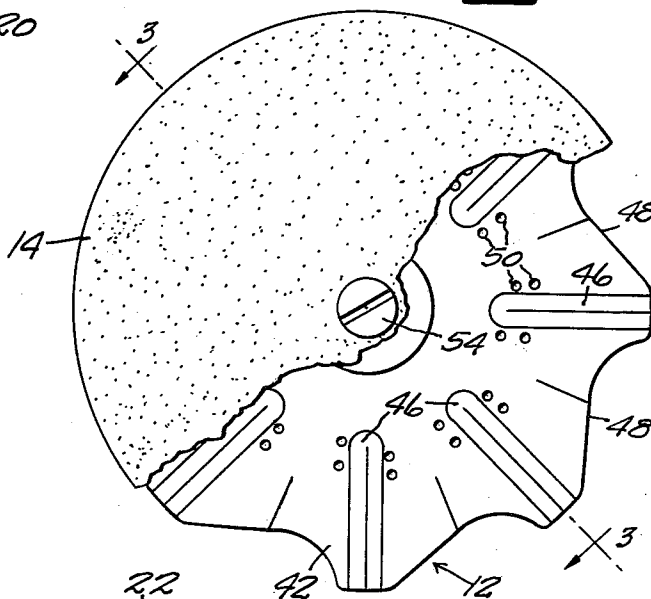
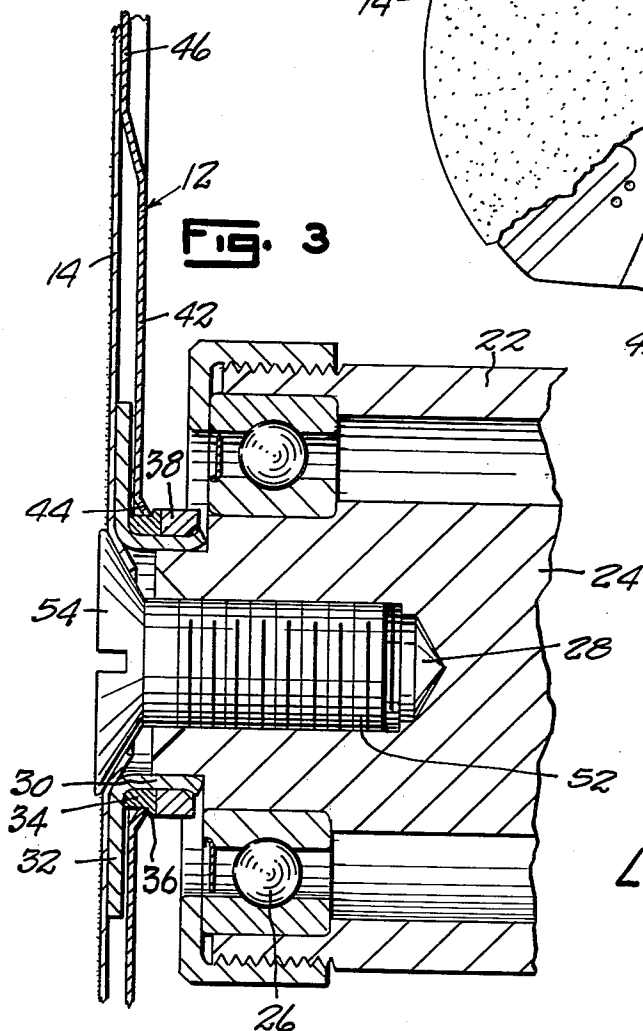


FIG. 3



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FIG. 4

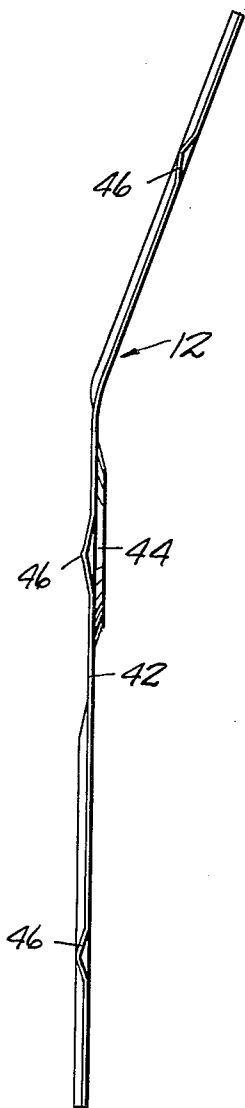


FIG. 5

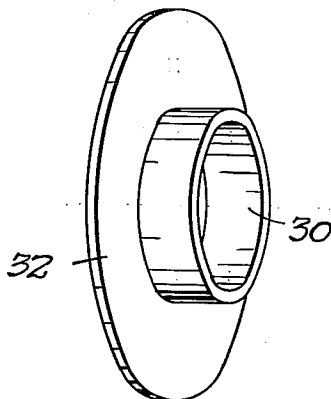


FIG. 6

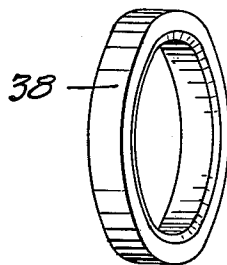
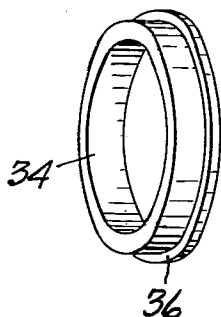


FIG. 7



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FIG. 8

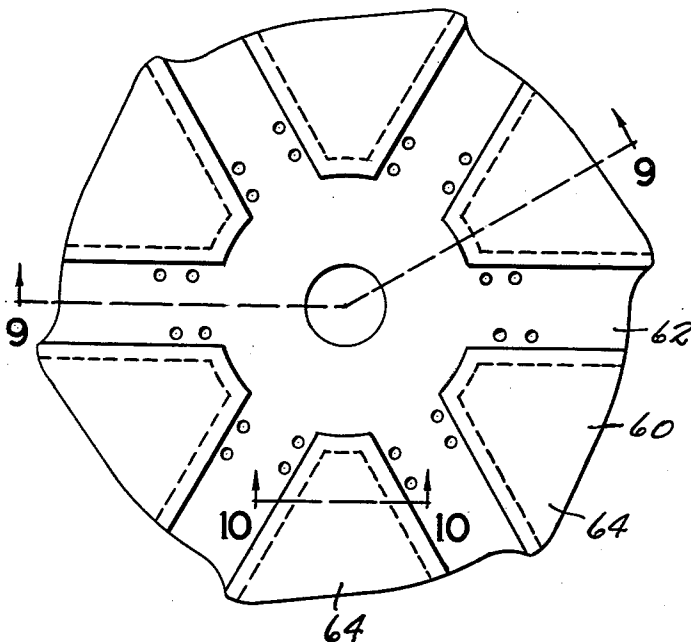


FIG. 9

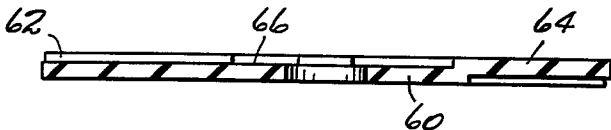


FIG. 10



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BACKING PLATE FOR ABRASIVE DISKS

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Filed Jan. 3, 1961, Ser. No. 80,191

11 Claims. (Cl. 51-195)

This invention relates to improvements in backing plates for abrasive disks employed for grinding and surface finishing of metal and other objects.

The primary object of this invention is to provide a backing plate for mounting an abrasive disk which is so constructed that wear upon the disk will occur substantially uniformly circumferentially thereof.

A further object is to provide a device of this character wherein relative rotation may occur between an abrasive disk and a backing member therefor.

A further object is to provide a backing plate for abrasive disks characterized by a hub and a backing disk rotatable upon the hub and provided with spaced projections upon a face thereof confronting an abrasive disk and engageable by such disk during use.

Further objects will be apparent from the following specification.

In the drawing:

FIG. 1 is a perspective view of an assembly utilizing my improved backing plate for abrasive disks;

FIG. 2 is a face view of an abrasive disk and backing plate in operative relation, with parts of the abrasive disk broken away;

FIG. 3 is a fragmentary sectional view taken on line 3-3 of FIG. 2;

FIG. 4 is a sectional view of a backing plate element illustrating the same in a flexed condition incident to use;

FIG. 5 is a perspective view of a hub member employed in the device;

FIG. 6 is a perspective view of a retainer ring forming a part of the device;

FIG. 7 is a perspective view of a bushing forming a part of the device;

FIG. 8 is a face view of a modified construction of a backing plate element usable in the device;

FIG. 9 is a sectional view taken on line 9-9 of FIG. 8.

FIG. 10 is a fragmentary sectional view taken on line 10-10 of FIG. 8.

Referring to the drawings and particularly to FIGS. 1 to 7, inclusive, which illustrate one embodiment of the invention, the numeral 10 designates an electric motor or other power member serving as an actuator for a grinding or polishing unit of the character having a backing plate 12 and mounting an abrasive disk 14. The power member is preferably portable, although it may be mounted upon a stationary frame or support (not shown) if desired. In the form shown the casing of the motor or power member includes a tubular projecting portion 16 connected with a flexible cable or other lead connected to a source of power for driving the actuator 10. The actuator housing may also include a second projecting hand grip portion 20 so located with respect to the part 16 as to facilitate convenient manipulation of the grinding assembly when the same is grasped by a user at the parts 16 and 20, in the manner well understood in the art. The motor 10 may include a sleeve or collar 22 projecting therefrom and enclosing a motor shaft 24 which may be journaled in suitable bearings 26. The outer end of the shaft 24 preferably has an axial screw-threaded bore 28 therein, for purposes to be described.

My improved backing plate unit 12 includes a hub portion or tube 30 from one end of which projects an annular flange 32 extending perpendicularly to the axis of the hub and projecting outwardly from the hub. The

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flange 32 is preferably comparatively thin and is small compared to the size of the backing unit assembly 12. A bushing member 34 encircles and is rotatable upon the hub 30 and its axial dimension is short compared to the length of the hub 30. An annular flange 36 preferably projects from one end of the bushing. A retainer ring 38 is mounted upon the hub 30 for abutment with the flange 36 of the bushing. The retainer ring 38 is preferably provided with a chamfer accommodating anchorage of the retainer upon the hub 30 by means of an outwardly flaring end portion of the hub 30, as illustrated in FIG. 3.

The backing element 42 is journaled upon the hub by means of the bushing 34. As here illustrated, the plate member 42 is preferably formed of metal, such as spring steel, and has a central aperture therein of a diameter to fit upon the bushing 34. The plate 42 is preferably flared at 44 around the aperture thereof. The assembled position of the plate 42 is illustrated in FIG. 3. One face thereof is juxtaposed to a face of the hub flange 32 and the inner margin of the opposite face thereof is positioned in abutment or adjacent to the flange 36 of the bushing 34. The plate member 42 is so mounted as to be capable of rotation independently of the hub 30, the hub flange 32 and the retainer ring 38. The plate member 42 is preferably characterized by a plurality of substantially equally spaced integral offset rib portions 46 extending to the outer edge of the member 42 with their inner ends terminating spaced from the flared central portion 44 a distance greater than the width of the hub flange 32. Ribs 46 are preferably offset from the plane of the member 42 a distance equal to or greater than the thickness of the hub flange 32, whereby they are adapted to engage the rear face of the abrasive disk 14. The edge of the plate 42 is preferably notched or recessed at 48 between adjacent ribs 46 and a plurality of apertures 50 are provided in the plate 42, preferably being located between adjacent ribs 46 and spaced inwardly from the marginal edges 48 of the member 42.

The abrasive disk 14 is provided with a central aperture and is of a diameter substantially equal to or slightly greater than the maximum diameter of the backing plate member 42. A screw having a threaded shank 52 and an enlarged head 54 is utilized for the dual purpose of mounting the unit upon the end of the shaft 24 and for anchoring the abrasive sheet 14 detachably to the hub by screw-threading its shank within the bore 28 of the shaft 24. The head 54 of the screw is preferably beveled and overlies the inner margin of the abrasive disk 14 and serves to clamp the same detachably against the end of the hub at the inner margin of the hub flange 32. Removal of the disk and of the backing unit is accommodated by removal of the locking screw 52, 54. The thread of the screw shank 52 has a lead in a direction correlated to the direction of rotation of the shaft 24 so as to avoid any tendency of the rotation of the shaft to loosen the screw 52.

In the use of the device, when assembled as illustrated in FIGS. 1 and 3, operation of the actuator 10 to rotate the drive shaft 24 produces rotation of the hub 30 and the abrasive disk 14. The journaling of the backing plate element 42 upon the hub by means of the bushing 34 eliminates any positive driving relation between the plate 52 and the motor. Rotation of the plate member 42 is limited to and produced by an indirect friction drive and more particularly by the friction drive between the abrasive disk 14 and the plate 42. In this connection the fit of the plate 42 upon the hub is such that slight clearance exists between the plate 42 and the hub flange 32 so that frictional drive transmitting engagement between the plate 42 and the hub 30, 32 is avoided or is negligible.

After the abrasive disk 14 has attained operative speed

it is applied to a work piece to be abraded or surface finished, thereby pressing the abrasive disk into firm contact with one or more of the ribs 46 of the plate 42 so as to effect a friction drive between the plate 42 and the abrasive disk. The particular points at which the disk is engaged by the ribs 46 of the plate 42, when the latter achieves full speed of rotation, is a matter of chance in each operation and will vary between successive operations. Consequently, during each use of the abrasive disk wear will occur in the areas of contact of the abrasive disk with the backing plate ribs 46, but these areas will differ in different operations. The result is the avoidance of limited areas of wear of the abrasive disk and a distribution of the wear of the disk substantially uniformly. This distribution of the areas of wear of the disk enhances or prolongs the wearing life of the abrasive disk automatically and without requiring any conscious effort on the part of the operator to achieve that result.

The free spinning mounting of the backing plate 42 upon the hub of the device imparts an important safety factor to the device, in that positive drive is imparted only to the abrasive disk and to the hub of the device but not to the backing plate member per se. The avoidance of a positive drive of the backing plate member 42 reduces the force necessary to stop rotation of that plate while operation of the motor shaft and the abrasive disk continue. Thus, if the edge of the plate 42 should engage an obstacle in a manner tending to stop rotation of the plate while operation of the motor continues, the shock of impact is reduced compared to the shock which would occur in cases where the backing plate is positively driven. This shock tends to move the entire unit away from the work and might cause the assembly to be jerked from the hands of the operator or jerked or moved in a direction against the operator or against a foreign object with resultant danger of injury to the operator or to the object. The free spinning mounting of the plate 42 in the instant construction minimizes the force tending to displace the assembly from the work incident to contact of the backing plate with an obstacle and thus increases the possibility that the operator may retain control of the unit so as to prevent the unit from contacting his body or any other object incident to rebounding action after the plate 42 strikes the obstacle. Stated differently, during operation of the device, the high speed of rotation produced by a powerful actuating motor causes a rebound or displacing movement of the assembly when the backing plate strikes an obstacle which tends to stop the rotation thereof. This rebound or take-off action is reduced in the present device so that the force required to be exerted by an operator of the device, in order to prevent loss of control of the device, is much less than with present grinding devices wherein the backing plate is positively driven. At the same time, if the marginal edge of the abrasive disk is gripped or caught during use, the force exerted may be withstood by sufficient operator-applied resistance to cause tearing of the abrasive disk, and this action is facilitated by free spinning mounting of the plate 42 permitting it to stop when the disk is stopped.

While a ribbed metal plate is preferred as a backing member for the abrasive disk, it is not essential. Thus the ribs may be omitted and a substantially flat backing plate may be utilized. Such a backing plate will provide circumferentially uniform wear of the abrasive disk and will provide the safety factor above described in the event of contact of the backing member with an obstacle which tends to stop rotation thereof. Other types of backing members may be employed as desired, and one such construction is illustrated in FIGS. 8 and 9 wherein a disk formed of rubber or fiber or any other material found suitable and identified by the numeral 60 is journaled upon bushing 30 and is provided with radiating grooves in one face thereof at 62 defining or outlining in-

tervening circumferentially spaced abrasive disk engaging portions 64 which preferably project outwardly from the plane 66 of the central portion of the member 60 confronting the abrasive disk. In such a construction substantially the same advantages are attained in use as in that described above.

While the preferred embodiments of the invention have been illustrated and described, it will be understood that changes in construction may be made within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. In combination, a hub, a bushing rotatably encircling said hub, means locating said bushing axially on said hub, a backing member carried by said bushing, an abrasive disk, and means securing said disk to said hub, said backing member confronting and supporting said disk in use, said locating means including a flange projecting outwardly from said hub and cooperating with said securing means to anchor said disk.

2. The combination defined in claim 1, wherein said backing member is of substantially uniform thickness and is configured to provide a plurality of circumferentially spaced ribs confronting and adapted to be engaged by said disk.

3. In combination, a drive shaft, a hub carried by said shaft and having a flange projecting radially from one end thereof, a bushing rotatably encircling said hub, means cooperating with said flange for retaining said bushing on said hub, a backing member carried by said bushing and rotatable relative to said hub and flange, an abrasive disk bearing against said flange, and means for securing said disk on said hub and securing said hub on said shaft.

4. The combination defined in claim 3, wherein said backing member has a configuration defining ribs radiating from the central portion to its outer margin and confronting and adapted to be engaged by said abrasive disk.

5. The combination defined in claim 3 wherein said backing member is formed of resilient metal adapted to flex under pressure applied to said disk in use.

6. The combination defined in claim 3, wherein said backing member is formed of thin material of substantially uniform thickness having a plurality of ribs offset therefrom and circumferentially spaced to engage and support said disk in use and to provide air pockets between said backing member and disk.

7. The combination defined in claim 3, wherein said backing member is formed of thin resilient material of substantially uniform thickness contoured to provide spaced ribs extending inwardly from the margin thereof to a point spaced from the center thereof, said backing member flexing under pressure applied at an angle thereto during use and returning to normal shape upon release of pressure.

8. The combination defined in claim 3, wherein said backing member is of substantially uniform thickness and has an irregular surface confronting said disk and constitutes a thin resilient member capable of flexing during application of pressure to said disk in use and returning to normal shape upon release of pressure.

9. In combination, a drive shaft having a threaded bore at its end, a hub abutting said shaft at one end and having a radial flange at the opposite end, a bushing rotatably encircling said hub, means cooperating with said flange to retain said bushing, a backing member carried by said bushing and rotatable relative to said hub and flange, an abrasive disk bearing against said flange, and a member screw-threaded in said shaft bore and having an enlarged head clamping said disk against said flange.

10. In combination, a hub having a flange at one end, a bushing rotatably encircling said hub, a bushing retainer carried by the opposite end of said hub, a backing member mounted on said bushing and rotatable relative to said hub and flange, and means for fixedly anchoring an abrasive disk on said flange in substantial register with said backing member.

11. In combination, a hub having a projecting flange, a bushing rotatably encircling said hub, means locating said bushing axially on said hub, a backing member of substantially uniform thickness carried by said bushing, an abrasive disk, and means clamping said disk on said hub flange in substantial register with said backing member, said backing member having a contour whereby the surface of said backing member confronting said disk is interrupted to accommodate contact of said disk therewith at circumferentially spaced points.

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